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THE MUSHROOM GROWERS'
ASSOCIATION

MGA

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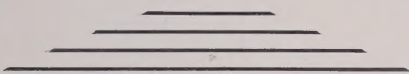
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EDITORIAL**DECISION IMPERATIVE**

A decision of considerable importance to Mushroom Growers in this country will be taken when the MGA Executive Committee meets before the Lindfield Nurseries Farm Walk on 19th June, for the main item on the agenda is Publicity and the progress so far made with the voluntary levy scheme of which all members should by now be aware.

In spite of every effort—other than supplying the actual pen or pencil—no less than fifty per cent. of the Grower Members have not bothered to indicate their approval or disapproval of the proposed scheme. On the credit side, however, over forty per cent. have signed in approval and again on the credit side, about seven per cent. have indicated disapproval with a forthright “No.” It is not then with this seven per cent. that a quarrel is sought, but with the fifty per cent. to whom the effort of replying and, at the same time, giving any clear indication to the Committee, has been too much bother. Admittedly this is an age of inertia, an age in which even the simple tasks of life assume the undignified proportions of a burden but, one way and another, those whose daily tasks are close to nature are not usually susceptible to the ways of the many whose lives, humdrum in the extreme, are, by force of circumstances, an open invitation to boredom.

It is, therefore, all the more regrettable that a compact and comparatively prosperous group like this Association finds, in its ranks, upwards of half to whom the writing of a mere signature and the crossing out of a few words requires too much effort. Nor can it be due to indecision, for although a few may well have been so smitten, the majority surely did not fall into that semi-humorous characterisation of the daily Press—the “Don’t Knows.”

If the members require action from the Executive Committee and the Publicity Sub-Committee—and the records show that these Committees have been extremely active during the past year—then the Committees have every right to demand action from the members. That is precisely what is demanded—ACTION. There is still time, before 19th June, for those outside to come inside. It is high time they said either “Yea” or “Nay” without more ado.

In taking over the Editorial chair from Mr. F. C. Atkins, I do so with certain disadvantages. He not only brought his journalistic skill to bear on this not too easy task but, behind him, had an almost unsurpassed knowledge of mushroom growing. My own knowledge of growing, more, true, than it was six months ago, is woefully lacking but, with the help and encouragement of the Editorial Board and your forbearance, all should be well.

W.R.A.

My opinion on **ROSE COMB**

Dr. Kurt LOHWAG *

"It is always very difficult to find the right answer for the cause of an abnormality," says Fred. C. Atkins, when giving his opinion on this subject, as a grower, in his book "Mushroom Growing To-day," and I would like to supply some examples of this kind of abnormality which occurred out of doors.

E. Ulbrich (1926 and 1933, *Morchelloide und tremelloide Formen von Agaricaceen I und II*, Notizbl. d. Bot. Gart. u. Mus., Berlin-Dahlem, IX und XI) has called malformations of this type "morel-like" and could give examples of 17 different species of the *Agaricaceae*.

Out of this collection I will only mention the species *Chanterelle*, *Panther-Amanita*, club-footed *Clitocybe*, velvet-footed *Collybia* and inrolled *Paxillus*. These facts prove that abnormalities of this type can also occur in nature and not only in culture-rooms.

In my opinion there are some innate and external causes of importance which influence the fungus to form such a malformation. On the one hand the fungus must be fit to give such a reaction, and on the other hand, there must be a substance which influences the formation of the hymenium on the top of the fruit body. If this substance is not in the right concentration in the fruit body and is mislead to the surface of the fungus the malformation begins. One can compare this substance with the phytohormones which we know from the higher plants.

*Dr. Kurt Lohwag is, among his other activities, a Lecturer on Plant Pathology in Vienna.

AT LAST!

The enclosed hand-out and leaflet of month-by-month recipes have been designed by the Publicity Sub-Committee to both stimulate the demand for mushrooms and to explain the difficulties of mushroom growing.

The hand-out, written by Mr. Fred. C. Atkins, will, it is hoped, encourage an interest in mushroom consumption but not in growing.

It will be observed with regard to the recipe leaflets, that each one is couched in simple, every day language, easily understandable by every housewife. The lay-out of the leaflet enables the whole to be cut into four parts, each containing three recipes which, in turn, can easily be detached separately. The incorporation of these recipes in housewives' cookery books has thus been made as easy as possible.

Some thousands of copies of both the hand-out and the recipes were distributed at the Chelsea Flower Show, where the MGA exhibit on the Bradford Fertiliser Stand created a great deal of interest. Centre of attention was the model mushroom farm made by Mr. G. V. Allen, of Biltong, Kent.

Copies of the hand-out are obtainable from the MGA office at 6/- per 100, and the recipes for 5/- per 100.

WORK AT ESSEN, GERMANY

by Dr. H. REMPE

For a few years Mushroom Research has been connected more or less incidentally with the German Research Association.

After lack of contact with the rest of the world during and after the Second World War, experiments were carried out firstly to find out whether sawdust was a suitable substitute for horse manure. Easy handling, rapid absorption of water and low cost are the advantages of sawdust composts; relatively dense layers and, as a result, slower mycelium development and a longer cropping period are the disadvantages. The total yield is not less than with horse manure:

(a) 12 kg. per sq. metre (2.5 lb. per sq. ft.) on shelves with 18 cm. (7") of strong compost; and

(b) 8.7 kg. per sq. metre (1.8 lb. per sq. ft. (in boxes with 10 cm. (4") of strong compost.

Cropping period 3½ months and 6 months respectively.

The cropping periods were, of course, too long, and therefore a number of tests were made in order to improve the structure of the compost by mixing in various quantities of wood shavings, horse manure and chaff. These experiments have reached a decisive stage and so it is worthwhile to report more fully.

The experiments with pure sawdust, as also those with pure straw composts, had shown considerable differences in the development of the composting. Sawdust from deciduous woods (beech, birch, poplar) ferments best; that from coniferous woods (fir, pine) is more difficult to prepare. The latter takes longer to break down (mostly 4-6 weeks). Chaff produces an excellent compost, but lies at first too loosely and therefore rots slowly and, furthermore, takes up water only with difficulty. Straw compost, on the other hand, once it has settled down after the first turn, is ready in four weeks.

From these observations came the logical decision to try composting with sawdust and straw mixtures, and it soon became clear that sawdust and chaff mixed together in equal proportions were the ideal combination. **Practically the same results are obtained with this mixture as with good horse manure and straw.**

From a purely structural point of view the sawdust helps the concentration of the straw (as do horse "droppings") and the straw helps to aerate the sawdust. The formula is as follows:

1,000 kg. air-dry sawdust (fir).
1,000 kg. air-dry wheat straw (8-15 cm.).
120 kg. carbonate of lime (90% CaCO_3).
30 kg. Thomas meal (16% P_2O_5)*.
150 kg. malt culms.
50 kg. urea (46% N.).
Plenty of water.

*A phosphate fertilizer similar to basic slag.

This mixture ferments in piles 2m. broad and 1·60m. high with bales of straw round it, rots even at -15°C . outside temperature in two days at 70°C . (158°F .). After the second turning, i.e. after 14 days, the compost is ready to be brought in and pasteurised.

Nutritive substance and structure are optimal so that a rapid crop can be attained.

We have learnt that with a good compost alone all the requirements for a satisfactory harvest are *not* fulfilled. Further requirements are good spawn and a sterile and damp layer of casing soil. Therefore experiments are now being made with various German and foreign spawns as well as with various natural and synthetic "casings".

In Western Germany a topsoil mixture of two parts pumice gravel and one part coarse peat (1-3 cm. large pieces of sphagnum peat) has shown itself superior to all other natural soils. To every 70 kg. bale of coarse peat, 20 kg. carbonate of lime is added. One cubic metre of this topsoil costs about 12 DM. (£1), including transport. The pH value is 8.

As in Germany most cultivation is done underground without pasteurisation, nematode infection of compost is the main trouble encountered. Special experiments have therefore been carried out concerning the spread and influence of nematodes in compost and mycelium. The following basic facts have been ascertained:

1. In the non-pasteurised composts of floor beds, non-parasitic eelworms of the species *Rhabditis*, *Cephalobus* and *Diplogaster* are found alive in large numbers.

2. The greatest concentrations were found just under the casing soil. This indicates that they like similar conditions to those favoured by the fruiting mycelium.

3. From a whole series of tests it transpires that these non-parasitic nematodes, after a period of incubation and in concentration of 40,000 to 70,000 to each litre of compost, poison the compost so much with their secretions that the mycelium disintegrates.

4. By means of pasteurisation, badly infected compost can be made useable again. Badly infected non-pasteurised compost is dangerous for garden and agricultural use and can cause damage to growing plants.

Other than nematodes we have few troubles in Germany. They are generally speaking, neutralised by modern insecticides and fungicides, provided no basic error is made in cultivation.

A special task of our Experimental Station has been to test the methods of cultivation used with the tray and shelf systems, not only in special houses but also in the usual underground rooms. We have available for this purpose a well insulated special house on the English plan, 4×12 metres floor space and 2·2 metres high, and also an air-raid shelter of 600 sq. metres floor space. In the shelter, tests are being carried out with 2,000 fish boxes; in the special house 30 sq. metres of shelf space lies down one side, with 38·4 sq. metres of tray space

opposite. We are convinced that for the larger underground rooms 'pasteurized trays' are a necessary evil and represent the best solution. With the new straw-and-sawdust composts the trays in four months from pasteurisation produce 8-10 kgs. per sq. metre from 10 cm. of compost.

Under identical conditions in the special house with equal lengths of pasteurisation time in shelves and in trays, spawn growth at 24° C. and picking at 15-16° C., the shelf system both from the point of view of labour and of returns appears superior. The first test which has just been completed, and which admittedly was hampered by a few minor 'teething troubles', produced within three-months from incubation the following results:

Per sq. metre shelf space (18 cm. compost)—3.84 kg.

Per sq. metre tray space (10 cm. compost)—1.00 kg.

The first attempt is not conclusive, but should similar results be obtained in the next tests, when the teething troubles have been overcome, it will mean the end of the Tray System in special houses—as far as we are concerned at any rate.



A small manure turner working with synthetic compost.
Mushroom house in background.



Shelves (on left) and Trays (on right)
in the Mushroom house.

ANOTHER MUSHROOM SECRET !

A mammoth mushroom, 10½ inches in diameter and weighing 14¼ ounces, is the result of a new and "top secret" method of fertilising devised by Mr. G. E. Summers, a Birlington (near Pershore) market gardener. "It's the biggest I've ever seen," says Mr. Summers, and he has had a long experience of mushroom growing. The success of his new method, *which he intends to keep strictly to himself*, can be judged by the fact that mushrooms grown in the same conditions without receiving special treatment are of quite normal proportions—round about three inches in diameter. *BERROW'S Worcester Journal*, 29.8.52.

THE FRED. ATKINS ALPHABET—F

Fans. In properly designed shelf houses where there is a generous air-bed ratio, circulating fans are surely unnecessary? In tray houses they can serve a useful purpose throughout the cropping period; turbulence is the codeword to-day. There is considerable conflict of opinion as to whether fans are more effective than ordinary ventilators to introduce fresh, or extract stale, air; but I cannot help feeling that the average grower's ignorance of the mechanics of air movement is costly. I argue with the best, and sometimes win—because I *know* I know so little.

Farm Walks: "There is no profit to be had from staying, smug and satisfied, at home; much to be gained from the free flow of ideas and experience while visiting a neighbouring holding," said the *Commercial Grower* on 23rd April, this year.

Filing. A dull but important facet of every business except, it seems, mushroom growing. Which may explain something.

Filling. For heaven's sake do it properly, even though it takes a little longer. There are too many hole-in-corner growers.

Fire-fang. A sign of activity by Actinomycetes, indicative of dry heat in the compost. A little is always good to see. Sarazin discovered that moisture squeezed from fire-fanged manure successfully controlled *Mycogone* disease when sprayed on the bed.

Firming. Before peak heating, the beds or trays should be firmed if the compost is long and dry, left loose if it is short and wet, and, if neither of these, left to the mood and instinct of the harassed overseer.

Flame gun. Some textbooks urge us to flame our bedboards between crops to stop carry-over of disease. But don't expect your insurance company to play the blue-eyed boy if you burn down your farm in a fit of depression.

Formaldehyde. Our general-purpose fungicide, used as formalin in a 98 per cent. dilution of a 40 per cent. solution, or released from formalin by the addition of potassium permanganate crystals (1 lb. to 2 pints formalin per 1,000 cubic feet of air).

Fuel. Mushroom growers were entitled to the glasshouse allocation, *viz.*, 180 tons of anthracite per acre (i.e., 1 ton to 242 sq. ft. of floor space, not bed area), following representations made by the MGA in 1948, when the Ministry of Fuel suggested 1 ton to 2,000 sq. ft. of bed area.

Fungicides. Use with care and discretion—and let someone else try the new ones first.

Fusarium. According to F. C. Wood, the only mycologist who appears to have done any work on *Fusarium* and Damping-Off Disease of mushrooms, the first sign is small, withered, brown and undeveloped mushrooms, with a matt surface and a dry and pithy interior. In the United States they do not know what causes this wilting, but have not accepted Wood's theory.

Flavour. Delectable; but the Publicity Campaign must teach the country how to prepare mushrooms properly. The use of mycelium to add flavour to soups and other preparations is in its infancy, as yet.

Flies. The cleaner the farm, the less chance of a fly infestation. The judicious use (and interchange) of insecticides should prevent a build-up of resistant strains of fly.

Floors. There's nothing like concrete—and the more the better.

Flushes. Does anyone know why a mushroom bed crops in flushes? Is it storing up food, or getting its second wind, or adjusting its pH, or—what?

Folic acid. An essential B vitamin found in mushrooms, as well as in spinach and liver.

Food Value. Considerable—and not so expensive, surely, if you *enjoy* eating mushrooms, and realise how miraculously the presence of one or two heightens the flavour of the accompanying food.



6—COMPOSTS AND COMPOSTING

So far, no attempt has been made to describe the actual cultivation of mushrooms, only to prepare the beginner in advance for any eventualities, since, once the growing houses are filled, it is no good thinking belatedly of water supplies, insulation, etc., if these have not been allowed for.

We are now ready for the complex, highly debatable first stage of mushroom growing: the preparation of compost from which the mushrooms get their food, and more important still, their stamina. Two identical supplies of fresh manure will produce, under different composting conditions, both strong and weak crops. The reasons for this will be given during the description of the process.

Because the beginner should start with a standard method requiring 3 to 4 weeks of preparation, he will have that period of time in which to put the finishing touches to his farm, from the day when the manure is delivered. In other words, the composting shed should be the first area to be completed, and the manure may be ordered as soon as he is certain that the first growing house will be ready within three weeks of its arrival.

Roughly speaking, the raw materials for a mushroom compost should consist of a bulky fibrous material, impregnated with suitable food such as animal droppings, or any organic material which will provide nitrogen in reasonable quantities, together with salts of potassium, phosphorous and other inorganic elements in varying proportions. These proportions are not absolutely critical, but it is believed that, the nearer they are to a certain ratio, the better the yield of mushrooms.

Practically any fibrous matter will do, but the results vary greatly, and the usual practice is to employ long wheat straw, or, if not obtainable, barley straw. Oat straw breaks down too readily and leads to pasty composts, which are to be avoided. Bracken has never been used seriously, but might be suitable, while in America, such things as expressed liquorice roots and alfalfa (or lucerne as it is known in Europe) are used as the fibrous material for synthetic composts. In England, wheat straw is the only readily obtainable base for synthetics.

Among organic substances which are suitable for mushrooms are horse, pig and poultry droppings, dried blood, brewers' grains, activated sewage sludge and a host of waste industrial materials, some of which have never been tried on a really large scale. The beginner should ignore everything to begin with except the normal stable manure composts, and the safe long-composting period of 3 to 4 weeks. Stable manure is supplied by various dealers in that commodity, and there are two or three grades which may be obtained. There is the heavy "London" manure which is usually full of droppings and is almost too heavy, in that the end product may be too closely-packed and greasy unless handled properly. It is expensive when compared with a similar weight of light racing-stable manure, since it will fill nowhere near the same area of beds or trays for a given depth; but it can produce very heavy crops of mushrooms. It is normally diluted with from one to two times its weight of racing stable manure, which has comparatively few droppings and is always light-coloured and unfermented if fresh. One is sometimes lucky in obtaining manure from riding-schools, army depôts, etc., where the droppings are fairly numerous but the manure is fresh and still light to golden-brown in colour.

It is easy to trip up when ordering manure for a given area of beds or trays, and it is difficult to give a hard and fast rule for this, owing to the difference in moisture content at various seasons of the year. However, the following figures may be used to start with, until the grower gets used to his requirements.

A shelf bed house, of 2,000 sq. ft. area, with 8" beds, is comfortably filled, in summer by 13 tons, and in the winter by 19 to 21 tons, of fresh racing stable manure. It must not be forgotten that, the longer the composting period, the greater the reduction in bulk, and the less area covered in the beds. If arrangements can be made to collect one's own manure supplies by having contracts with numerous small stables, it will be readily seen that covered manure dumps are preferable to ones in the open, and that it would almost be better to supply the stables

with a light roof free of charge than to pay for the rainwater which soaks the manure at times between collections! This collection of manure is usually only possible in remote districts where the suppliers of stable manure do not find it profitable to collect.

When the manure arrives on the farm, it is dropped as close as possible to the area allotted to the first stack. From this moment on, the beginner is advised to start thinking very hard, and to use his powers of observation. The general advice given for stacking is that it is not a good thing to add water in the later turns, and that as much water as possible should be added at the stacking. This may be done if one knows how to nurse the compost through its peak heat, but the beginner is advised to spend some time on his watering in order to avoid possible trouble at the later stages. This will shortly be carefully discussed.

Fermentation in a compost is carried out by various organisms, such as bacteria, fungi, and actinomycetes. The latter, which are organisms half way between bacteria and fungi in classification, produce mycelium only, which breaks up in some cases to form what might be regarded as spores. These actinomycetes, which can operate at high temperatures, are the cause of the 'fire fang' or light area found just inside the compost walls, as well as the desirable 'speckled' appearance of a compost which has been peak-heated satisfactorily.

All the above mentioned organisms need moisture, oxygen and nutriment as well as provision for the retention of any heat generated by the action of the bacteria, which first take on the fermenting process. In other words, a pile of fresh manure, if left open and tufted, will only heat up where some moisture is present, and sufficient material round these parts to prevent the heat being dissipated is desirable. The section of a stack is usually rectangular or square, with a slightly domed top to allow for shrinkage. Provision should be made in cold weather for preventing cold winds from striking the walls of a compost, since fermentation will be retarded for quite a distance into the stack.

MAC'S MUSHROOM FAMILY

6. Mdlle. Claudette Champignon



MUSHROOM SCIENCE II

The Second International Conference on Scientific Aspects of Mushroom Growing was held at Gembloux, Belgium, from 16th to 20th June, 1953. The Proceedings of the Conference have now been published under the above title in a book of 183 pages.

Thirty-four papers were read, contributions coming from many different countries. Eighteen papers are printed in English, and the remainder in French. A brief summary in English is given of the papers in French and vice versa.

A wide range of subjects is included. In a short paper on systematic classification, the confused situation is stated by Louis Imler to be largely due to the variety of mycologists who like to see their name in print! P. Heinemann in another paper agrees that our knowledge of the genus *Agaricus* is not adequate, but gives his definite classification of cultivated species.

The use of radio-active phosphorus in experiments on mushrooms is described by Belgian workers who report results which will be helpful in carrying out further experiments of this kind. Other workers at Gembloux have carried out experiments proving that organic acids such as might be produced in badly handled compost have an inhibitory action on the growth of mycelium.

The use of ultra-violet radiation to obtain variant types or strains of the cultivated mushroom and methods employed in this work are described by American workers. The investigations have not been in progress for a sufficient length of time to observe whether any improvements have been obtained. At the Butler County Mushroom Farm, the basic culture is a single spore isolate made in 1940, which has proved particularly suitable for cultivation in mines. Five million pounds of mushrooms per annum are produced on this holding.

Mushroom production in France has not changed appreciably during the past 20 years, according to P. Guiochon. The bulk of the crop is produced in well ventilated caves, and the growers, obtaining satisfactory crops, are not anxious to change their methods. This outlook of "let well alone" might be copied with advantage by some English growers! The influence of French methods on Belgian growers is noticeable, but the speaker covering mushroom growing in Belgium included a comment that of all the problems facing the industry, the economic situation was by far the most important. So say we all!

Production methods in Germany are fairly static, but progress has been made in the control of diseases and in making better compost. A Federation has been formed to protect the interests of growers.

C. Riber Rasmussen, who has spent some time studying the subject in England, Holland, and the U.S.A., contributes some notes from Denmark.

A strong team, in the persons of Fred. C. Atkins, Dr. R. L. Edwards, P. B. Flegg and Miss D. G. Gandy, made contributions on current problems in mushroom growing and experimental work in progress in this country. The problem of the causal agent in the development of Bacterial Pit is posed by Mr. Atkins, with a possible explanation from A. Sarazin as to how the bacteria could be enclosed by shrinkage of the hyphae. Dr. Edwards discusses the effect of some cultural practices and interprets the result of a survey. The effects obtained by peak heating are shown to be variable, and it seems possible that this treatment is not always carried out correctly. Experiments on the use of artificial mixtures for casing as carried out at Yaxley are described in detail by members of the MRA staff; also the use of copper sulphate for the control of truffle.

J. Solari writing on the tray system as practised in France states that this is no "miracle method" which will solve all problems, but rather that one must give even more attention to all matters of detail if success is desired. Average yields given are good by our standards.

Air conditioning as recommended by the Institute of Horticultural Engineering in Holland is described and illustrated with diagrams.

A clear and concise account of Short Composting is given by Drs. Sinden and Hauser. Emphasis is laid on the importance of the size, shape and compactness of the pile in obtaining a uniform product.

Compost made from sawdust produced crops of 2.5 lb. per sq. ft. in Germany. Cost of materials is about the same as horse manure, but there is a saving of about 50% on haulage and labour in composting. Dr. Rempe does admit, however, that it is easier to compost horse manure if available.

The materials used in making synthetic compost in America are mainly corn cobs and hay. The proportions vary, but present practice is to use more cobs than hay in the winter months and reverse the quantities for summer crops. Figures are given which indicate a substantial saving as compared with the cost of making an equivalent quantity of compost from horse manure.

The control of *Ditylenchus sp.* by heat is shown by Eldon J. Cairns of U.S.D.A., Beltsville, to depend to some extent on the amount of moisture present in the compost. Dormancy, renamed anabiosis, is induced when the compost is dry and in this condition nematodes are much more resistant to the effect of both heat and chemicals. Their effective destruction is more easily achieved if a condition of high humidity is maintained for a few days prior to heat treatment. The same author gives data from experiments showing that the destruction of mycelium by nematodes is greatly reduced if the crop is grown cool.

Dactylium and two other diseases producing similar effects have been investigated by Drs. Sinden and Hauser. Useful results have been obtained under conditions of high humidity with daily

dustings with 15% Zineb, while treatment of individual infections with 15% calcium hypochlorite powder has reduced all three diseases to insignificant proportions.

Mushroom Science II presents a concise account of cultural practices and experimental work in progress on mushroom problems from all parts of the world, and will be of interest and value to every mushroom grower. **It is available from the MGA, Yaxley, Peterborough, at a cost of 12/-.**

The Third International Conference will be held in Paris in 1956.

GERMAN VISIT TO ENGLAND

A party of twelve German mushroom growers and research workers spent a week in England in May, visiting the Mushroom Research Station, Yaxley, and several leading farms.

The party was lead by Herr Erich Hullen, President of the German Growers' Federation, with Dr. Rempe, head of their Research Station at Essen. Both Herr Hullen and Dr. Rempe were members of the Second International Conference at Gembloux last year, and both read papers there on mushroom growing and research in Germany. Dr. Rempe had previously exchanged visits with Dr. Edwards, of the Yaxley Research Station, but this was Herr Hullen's first visit to England.

Monday morning was spent at the Research Station, after an abortive attempt to get there by a train which did not stop. The party saw and discussed the results obtained and work in progress, with the invaluable help of Dr. Rempe as interpreter.

There was considerable interest in the MRA formula for synthetic compost, and in the use of peat for casing. Germany has very large deposits of sphagnum peat, and indeed supplies large quantities to this country. They use mixtures of peat and soil for casing.

In the afternoon they visited the new farm of Messrs. Snowcap Mushrooms Ltd., where they were received by Mr. H. B. Luxmoore and Mr. J. A. Gooding. Here and at Noble Mushrooms Ltd. on the following morning they were much impressed by the high standard of organisation and cleanliness, and some of the sceptics who doubted the possibility of growing 3 lb. crops were persuaded that it might, after all, be done. At various stages of the tour small groups attached themselves firmly to one or other of their guides, Messrs. Fred. and Peter Atkins and Mr. Noble, to discuss what they saw, and they had to be gently urged on to the next part of the farm. Like so many visitors from overseas they were astonished to see casing soil being dug from a pit 15 ft. deep, and at the care taken to keep it free from infection. A photograph taken at Noble Mushrooms' farm appears in this Bulletin. The visitors' own cameras were busy throughout their stay. While at Yaxley some of them, members of the MGA, met the Secretary, Mr. Alderton, and others joined or expressed the wish to do so.

On Tuesday afternoon they travelled by coach to Mr. Cooper's Shadowlawn Nursery to see the tray system in operation on a small but up-to-date farm.

Wednesday was devoted to a visit to Mr. Middlebrook's farm. Opinion in Germany tends to favour shelves rather than trays, but as they have little experience with either they were keenly interested in a comparison of the two systems at Selby, and in Mr. Middlebrook's views on their respective merits. His farm was later described by one of the party as "the biggest experimental farm in the world."

On Thursday they left the Midlands and travelled to Worthing, with a break in London. Friday was spent in the Worthing area, starting at Messrs. W. Darlington's farm at Angmering, where they were able to see the tray system in use on a larger scale, with the full benefit of mechanical transport, etc.

During their stay we were interested to learn more about the present state of mushroom growing in Germany. Production is small compared with the potential market, and the average price is about 5/- per lb. There is an import duty of 25%. Yields also are generally low, but are not comparable with ours because, except for a few experiments, beds have always been laid on the ground in caves, cellars or underground air-raid shelters. Houses are now being built in which they hope for improved yields. The floor beds give much trouble with eelworms, but on the other hand Truffle was unknown in Germany



until very recently, when it appeared in one of the first tray crops grown there. (French growers who are adopting trays—please note!)

The sawdust composts described at the Second International Conference are in commercial use, but horse manure is still the main growing material.

The German Research Station, like all others, has difficulty in raising funds, but has solved the problem to some extent by cropping 8,000 sq. ft. which produces a substantial income. However, Dr. Rempe admitted that their dependence on this source of income severely cramps the course of their research, as they dare not undertake experiments which are liable to give low yields. They are interested in the opportunity provided by the range of spawns now available, and British spawn is being compared with German and other imported varieties.

Before leaving they expressed their appreciation of the arrangements made for the tour, and their gratitude to all the growers who had shown them round the various farms.

R.L.E.

THE FEARSOME PHORID

... "It makes you think," says *G. E. Pledger, Director and Secretary of Stable Manures Ltd.*

Writes Mr. Pledger . . . "I travel in the Sussex and Kent districts and have come across many complaints of the fly. Have any mushroom growers thought that the spread of this pestilential fly may have been caused by manure merchants collecting spent compost after delivering manure? Mr. Day (our representative) and I have seen manure delivered on a large mushroom farm, saw it unloaded and saw the lorry immediately backed up to a growing shed and loaded with spent compost. Needless to say, it wasn't one of our lorries.

In the Cranleigh area a grower complained to me that the merchant who had delivered fresh manure had not collected the spent compost and, in a discussion about the fly trouble I suggested to him that some of the trouble might well have been caused by the same lorries being used for both delivering manure and collecting the spent compost, without any precautions being taken, and his reply was 'It certainly makes you think.' It is well-known that compost, especially after being stacked for some time, can easily become riddled with disease.

I have, in Kent, been on mushroom farms where, among the precautions taken to avoid fly trouble and disease in general, was the provision of a small foot bath at ground level just inside each house, for dipping feet. This seemed to me a very sensible idea as also did the provision of a double door arrangement on another farm, where, in addition to the ordinary door, was a second, consisting of close mesh cloth fixed on a wooden frame which, whilst allowing a reasonably free passage of air, if required, prevented any flies entering that way.

It does seem to me that precautions such as these really cost very little and could so easily save growers a great deal of money."

NOTES FOR YOUR DIARY

- 19th June.** Farm Walk and Area Meeting, 2 p.m., Lindfield Nurseries, Lindfield, Sussex (Messrs. R. H. Filmer Ltd.).
- 6th—9th July.** Royal Agricultural Show, Windsor—MGA Stand in NFU tent.
- 17th July.** Farm Walk and Discussion at Mr. H. G. Bird's farm, Long Meadow, South Heath, Gt. Missenden, Bucks. 2 p.m.
- 4th Sept.** Scottish Farm Walk and Area Meeting, Albethy, Bridge of Allan, Stirlingshire (Mr. W. S. Galbraith).
- 7th—18th Sept.** British Food Fair, Olympia, London. MGA Stand with the Essex Farmers' Union Stand.
- 6th—7th Oct.** Annual Mushroom Industry Exhibition and MGA Annual meeting, Tunbridge Wells.

An area meeting in Scotland is long overdue as no such gathering has previously been organised. Mr. Galbraith, at whose farm the walk is to be held, has attracted some attention recently by his "thin bed" theory in recent Bulletins.

He started mushroom growing as far back as 1937 and, before the war, was co-managing director of a 25,000 sq. ft. farm. Now however he confines his activities to two small experimental farms, one of 1,600 sq. ft., a self-contained, all indoor unit comprising seven small growing rooms, a heat room and one for composting, and the other, a small farm of 2,000 sq. ft. consisting of outdoor frames electrically heated and with two heat houses.

As it is felt that a number of Southern growers might like to take this opportunity of a pleasant week-end in Scotland, enquiries have been made and accommodation can be arranged at The Alangrange Hotel, which is quite close to Mr. Galbraith's farms. Bed and Breakfast at this hotel costs 15/- per person or 20/- including supper. It has already been decided that the evening discussion, following the farm walk, should take place at this hotel. Members wishing to attend and who will also need accommodation, are asked to notify the MGA Secretary as soon as possible. For those who wish to make their own accommodation arrangements the names and telephone numbers of The Alangrange and other nearby hotels are:—Alangrange (Tel. Bridge of Allan 3335), Queens (3268), Royal (2284) and Allan Water and Spa (2293). All members attending are asked to notify the Secretary in order that satisfactory tea arrangements can be made.

NEW WORTHING AND WEST SUSSEX GROWERS' SECRETARY

Mr. Edgar Leslie Gibbs of Cranleigh Road, Worthing, former nursery owner, has been appointed Secretary of the Worthing and West Sussex growers' branch of the NFU. He succeeds Mr. G. Waterman whose retirement has been announced.

Mr. Gibbs, who took up his duties from 1st June, is the son of a clergyman and, after studying for the Church he took up forestry work and later became the owner of a nursery in Cornwall.

WILD MUSHROOMS—NEW ZEALAND

A record consignment of more than half a ton of mushrooms, gathered wild, arrived at Auckland, New Zealand, from nearby Marton, says the *New Zealand Herald* of 24th March, last. Rangitikei, in the Marton area, is recognised as one of the best natural mushroom producing areas in the North Island. Warm rain during the week end stimulated growth and adults and children swarmed over the fields filling containers. One man sent 31 boxes weighing over 3 cwt.

The *Christchurch Star* *Sun*, a fortnight before, commented on the short supply of wild mushrooms, blaming the dry weather, but adding "However, mushroom lovers will be pleased to hear that a shipment is being flown from Napier to-day and will be on sale in the town tomorrow. The quantity arriving is not very large and prices are expected to be moderately high."

A slight decline in the area of heated glass during last year is revealed in the January, 1954, census of glasshouse returns, taken by the Ministry of Agriculture. Mushrooms were down from 40 to 38 acres.

Commercial Grower, 23.4.54.

NEW TYPE OF TRACTOR

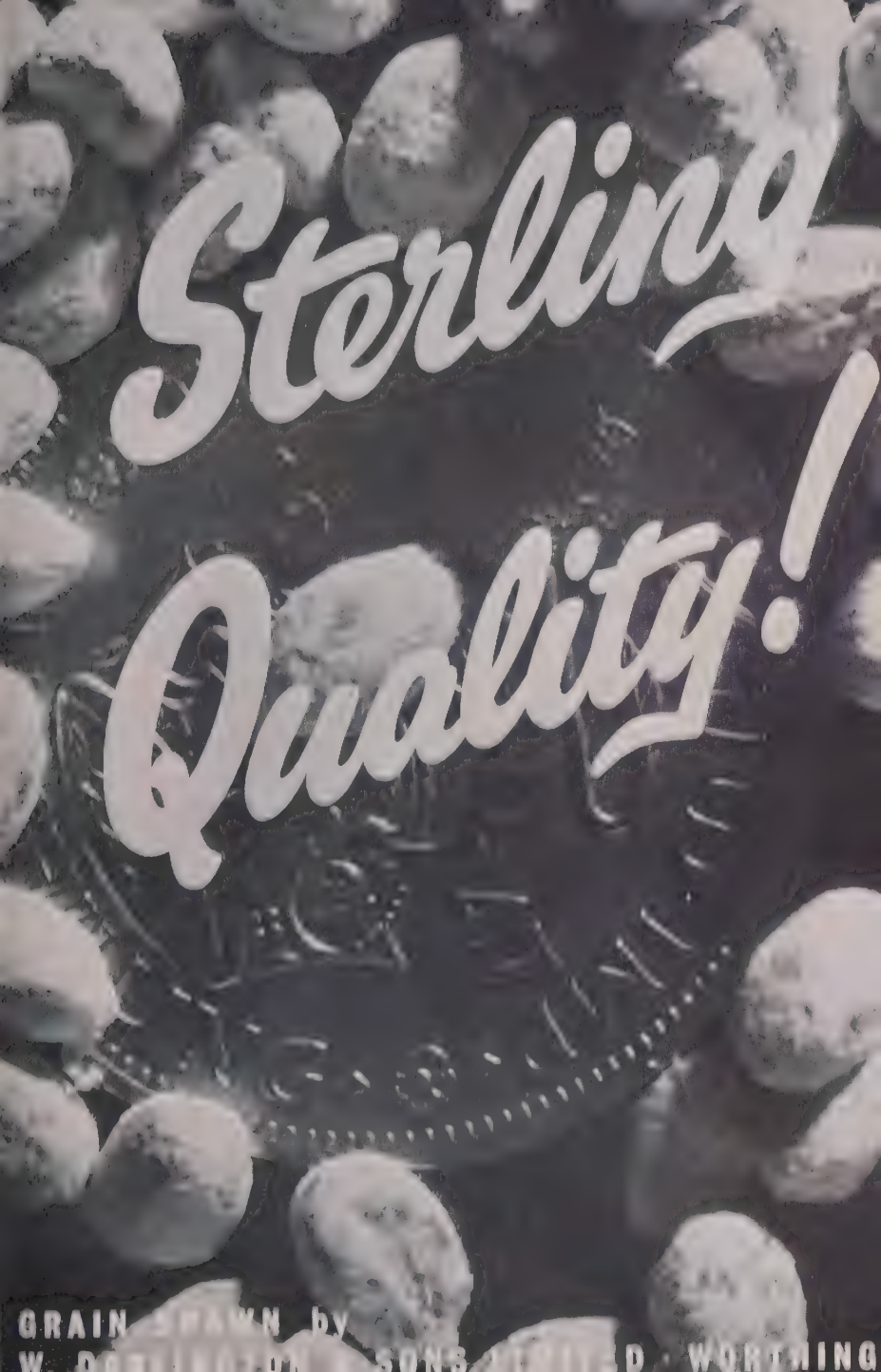
Considerable interest was taken in a completely new type of tractor—hydraulically propelled—at the open days of the National Institute of Agricultural Engineering, at West Park, Sibson, Beds., during the last week in May.

This tractor, a prototype, was only completed two or three weeks before and it had not previously been tested. It was explained that a considerable amount of experimental and development work on this new model still remained to be done.

It was claimed that this new method of driving offered several advantages, including:

1. The conventional clutch control and gear lever are replaced by a single lever giving a stepless speed control from full speed forward to full speed in reverse.
2. The arrangement of a hydraulic pump adjacent to the power unit and hydraulic motors built inside the driving wheels provides considerably more space for mounting implements.
3. The method of control is such that damage by careless or unskilled operators is less likely than with a conventional clutch and gear transmission. No damage is possible, for example, analogous to that caused by "riding" a clutch.

It remains to be seen whether the system is technically satisfactory and economically practicable.



Sterling Quality!

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'WARE BHC IN USED COMPOST

At a meeting in April of the Exeter and District Branch of the Pharmaceutical Society a warning against using spent mushroom compost containing BHC (benzene hexachloride) was issued by the provincial horticultural officer of the Ministry of Agriculture, Mr. W. C. Ibbett, N.D.H., who spoke on "Recent Trends in the Use of Insecticides."

Mr. Ibbett spoke of the increasing present day tendency to replace old and well tried insecticides like nicotine, derris and pyrethrum by alleged dangerous chemical compounds. Whilst commercial growers were required by law to protect themselves and their workers, amateur gardeners might take risks. Some insecticides—BHC for example—would taint root crops like carrots and potatoes and also onions. Mr. Ibbett gave an instance of a farmer using manure on 50 acres of potatoes and the subsequent crop was so badly tainted that it was unfit for either human or animal consumption. The manure, he said, was supplied by a mushroom grower who had used BHC.

From the *Pharmaceutical Journal*, 8.5.54.

PRESERVING MUSHROOMS

In the Annual Report of the Long Ashton Research Station for 1952, several methods of preserving and cooking mushrooms are compared. The pre-treatment of mushrooms, before freezing or bottling, was to scald for four minutes. Some mushrooms were frozen with no preliminary treatment.

The tasting tests were carried out after eight months storage and the cooking methods employed included re-heating, stewing in salted water or sauté in lard according to the original pre-treatment.

The texture of the mushrooms scalded before freezing was very tough but those sautéd or with no pre-treatment before freezing, were better. Bottled mushrooms were superior in texture to those which were frozen. The only mushrooms which had a flavour considered to be above average were those frozen with no pre-treatment and afterwards sautéd in lard.

P.B.F.

Lt. Col. Urwick suggested that the executive who tried to work 15 hours a day, seven days a week, was of no value to his firm. In the same way, he added, we get more production from a worker working 44 hours a week than from one employed for up to 52 hours.

Business, September, 1951.

Dr. D. W. Empsen urged growers to "rotate your insecticides." This was to prevent the build up of resistant strains. He later told them always to follow the makers' instructions regarding quantities ; obvious damage would be done by applying too much spray, but by putting on insufficient they would be giving the pest doses that were not fatal, and resistant strains would be built up as a result.

Fruit Grower, 6.12.51.

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GUERNSEY				

FOLIC ACID

We have had several inquiries recently for information on folic acid, one of the important constituents of the cultivated mushroom.

The only reference we have is *The Lancet* (the journal of the British Medical Association) dated 9th November, 1946, which states: "It is now clear that **Folic Acid** will take its place among the vitamins The name was originally given to an almost pure chemical substance isolated from spinach; it is found in many other green leaves, including grass, and in *MUSHROOMS*, liver and yeast."

The same article states: "The dosage of synthetic folic acid is being rapidly worked out. It can be given by mouth or parenterally dissolved in disodium phosphate. For *Pernicious Anaemia* the oral route is adequate; 20 mg. is given daily in the relapse phase and this dose is maintained until remission is well established, when it is reduced to 10 mg. daily or less In nutritional anaemias, 20 mg. daily seems adequate."

What we do not know is whether "consumption of mushrooms at fairly regular intervals will provide the human system with sufficient folic acid to maintain a properly-balanced supply of red blood cells," as an MGA member, Major J. Jones, asked recently.

THE MOON—AND THUNDERSTORMS

By JOHN F. BARTER

It is generally conceded that many of the old sayings and beliefs handed down to us from olden times contain an element of strictly scientific truth, although the originators may not have been able to trace effects to their scientific causes. An example of this is to be found in the old belief of the influence of the moon—either for good or evil—on vegetation. In this belief, our ancestors were certainly right—at all events, so far as mushrooms are concerned—for, other things being equal, crops invariably become heavier as the moon approaches the full, and decline again when she is on the wane.

Possibly this question of the lunar influence may not be unconnected with another, namely, the effect of thunderstorms on mushroom crops. A highly charged electrical atmosphere is fatal to the growth of mushrooms, and a heavy thunderstorm will, as a rule, entirely destroy the further bearing properties of a bed which has run about half its course.

In proof of this statement the following will be of interest :

I think it is well-known that there are electrical disturbances even without thunder. When our men, all of them of many years experience in the work, go to gather a bed that looked very promising at the last time of gathering, instead of getting a good fair-sized crop they find that the mushrooms have hardly grown, and that cups and buttons even to the size of a penny piece that should have been closed underneath all opened into small "broilers," the men say there has been a thunderstorm and they have good reason for their opinion as thunderstorms have invariably that effect on the beds.

If it is possible for a scientist to give an effectual remedy for this evil, he would be conferring an inestimable favour on all mushroom growers.

Reprinted from John F. Barter's *Mushrooms, and How to Grow Them*, 1912

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Manure for mushroom culture such as that
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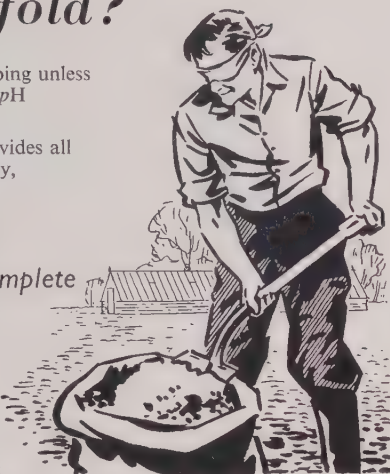
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Box of 6 tubes No. 4 @ 9/9 per tube (each tube contains 6 pellets each sufficient to fumigate 4,000 cu. ft.) .. **£2·18·6**

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VOLUNTEERS REQUIRED. The MGA Secretary will be glad to receive offers of assistance with the manning of the MGA Stand in the NFU tent at the Royal Agricultural Show at Windsor, on any day between 6th—9th July inclusive.

USED COMPOSTER, nearly new, Elevator and breaker type, Electric drive 220v. single phase, wheels, light and mobile. Offers to Putney Coombe Mushroom Farm, Upper Richmond Road, Putney.

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GYPSUM direct from Gypsum Mines 1 cwt. 6/6d., 5 cwts. 6/- cwt., 10 cwts. 5/6d. cwt., 1 to 5 tons £4 a ton, 6 tons £3 15s. 0d. ton. Carriage extra by road or rail at cost.

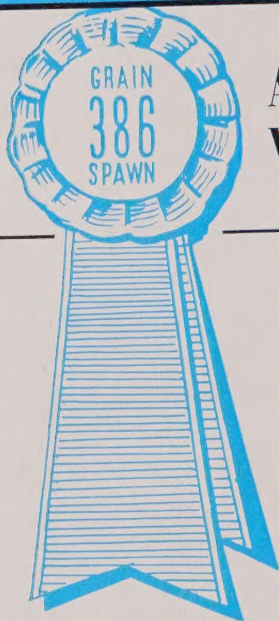
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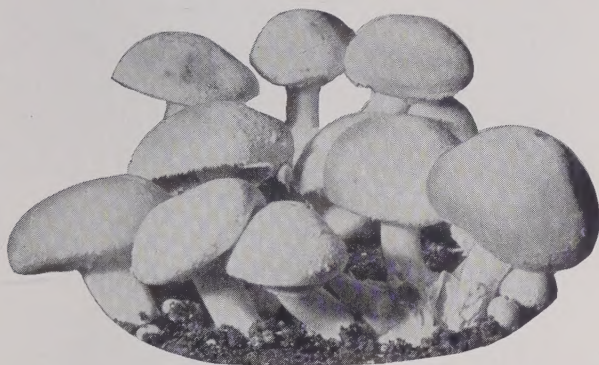
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received

I expect you would be interested in my results ; I added 22 lbs. carbonate of lime per cwt. of Peat and thoroughly wetted up Peat ; I cased after 14 days and four weeks after spawning picked the first mushrooms : the first heavy pick was five weeks from spawning. I have an excellent soil for casing here, but find that I can case with your Peat about four times easier and quicker ; furthermore the preparation of my heavy clay soil put quite a cost on it—in other words I find I can save time and money by using your Peat. I have now picked 2,300 lbs. from 1,500 sq. ft. in six weeks. I have had absolutely no disease ; and it looks as if I shall do $1\frac{3}{4}$ to 2 lbs. a sq. ft. which, considering my compost was solely long straw manure, I consider first class.

ECLIPSE MUSHROOM CASING PEAT

PACKED IN STERILISED SACKS

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Write for further details to :

THE ECLIPSE PEAT CO. LTD.

ASHCOTT - NR. BRIDGWATER - SOMERSET

TELEPHONE : MEARE HEATH 282 (2 lines)